

Work Order ID 135169

July 31, 2015 3:27:23 PM

Page 1

Item ID: D350-748-243TRN Accept

Revision ID:

Item Name: Crosstube Installation, High Aft

Start Date: 7/31/2015 Start Qty: 1.00 X

Required Date: 8/14/2015 Req'd Qty: 1.00

Reference:

Approvals: Process Plan: GU Date: 015073 Tooling: _____ Date: _____

QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

N900040100

Setup Start *NS1*

Stop *NS2*

Cust Item ID:

Customer:

Run Start *NR1*

Stop *NR2*

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
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Draw Nbr	Revision Nbr
D350-748-243	A

100 0.00

100

Mori Seiki

Mori Seiki CNC Lathe Large

MORI SEIKI CNC LATHE LARGE

Memo

0.03

1-Fill tube with sand & install plugs on both ends as per Folio _____

2-Turn first side as per Folio _____

3- File transition lines smooth.

FOLIO REV: AA

DWG REV: A

110 0.00

110

QC

Quality Control

QC1- Inspection performed by CMM

Memo

0.00

mmml
15/08/14

mmml
15/08/17

DQA: _____ Date: _____



WORK ORDER NON-CONFORMANCE / UPDATE

QA Closed: _____ Date: _____

Work Order update only ☐

Work Order: <u>135169</u> Part No. _____ NCR No. _____		DISPOSITION Rework ☒ Scrap ☐ Use-as-is ☐ Suspected Unapproved ☐		AGAINST DEPARTMENT/PROCESS <table style="width:100%; border: none;"> <tr> <td style="width:15%;">Skid-tube ☐</td> <td style="width:15%;">Cross tube ☐</td> <td style="width:15%;">Water Jet ☐</td> <td style="width:15%;">Engineering ☐</td> </tr> <tr> <td>Machining ☐</td> <td>Small Fab ☐</td> <td>Prod. Eng. Coord. ☐</td> <td>Quality ☐</td> </tr> <tr> <td>Thermoforming ☐</td> <td>Finishing ☒</td> <td>Rec/Store/Packaging ☐</td> <td>Other ☐</td> </tr> <tr> <td>Large Fab ☐</td> <td>Composite ☐</td> <td>Supplier ☐</td> <td></td> </tr> </table>				Skid-tube ☐	Cross tube ☐	Water Jet ☐	Engineering ☐	Machining ☐	Small Fab ☐	Prod. Eng. Coord. ☐	Quality ☐	Thermoforming ☐	Finishing ☒	Rec/Store/Packaging ☐	Other ☐	Large Fab ☐	Composite ☐	Supplier ☐																																																	
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Date : <u>15.08.10</u>		Step #: _____		QTY Effective : _____		MRB (QSI042) Approval <u>A.P.</u> <u>15.08.10</u>																																																																	
Description Work Order Deviation Apply Axalta 13205 S & Metalok 230S per manufacturer's instructions prior to paint NOT APPLICABLE A.P. 15.08.10				Disposition ACCEPTABLE PER TESTING BY CP				Completed By Lead hand / Supervisor Approval Verification DAS 47 9-89 15-09-16																																																															
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Work Order ID 135169

135169

Page 2

July 31, 2015 3:27:23 PM

Item ID: D350-748-243TRN

Accept

N900040100

Setup Start ***NS1***

Revision ID:

Stop ***NS2***

Item Name: Crosstube Installation, High Aft

Start Date: 7/31/2015 Start Qty: 1.00 ***1***

Cust Item ID:

Required Date: 8/14/2015 Req'd Qty: 1.00 ***1***

Customer:

Reference:

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____

Run Start ***NR1***

QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Stop ***NR2***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
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120

0.00

120

MORI SEIKI CNC LATHE LARGE

Mori Seiki

Memo

0.05

Mori Seiki CNC Lathe Large

1-Turn second side as per Folio _____
2- File transition lines smooth.
3-Scribe Part & Batches as per Dwg D350-748-143
FOLIO REV:
DWG REV:

1 0
mm
15/08/18

130

QC1- Inspection performed by CMM

0.00

130

QC

Memo

0.00

Quality Control

1 0
mm
15/08/19
P.T.O.
47
first page

140

QC8- Inspect parts - second check

0.00

140

QC

Memo

0.00

Quality Control

1 0
9-89
15-08-24

DQA:

Date: 15/09/28



WORK ORDER NON-CONFORMANCE / UPDATE

QA Closed

Date: 15/09/20

Work Order update only

Work Order: <u>135169</u> Part No. <u>D350-748-243TRN</u> NCR No. <u>15-5349</u>	DISPOSITION Rework ☐ Scrap ☐ Use-as-is ☒ Suspected Unapproved ☐	AGAINST DEPARTMENT/PROCESS <table style="width:100%;"> <tr> <td>Skid-tube ☐</td> <td>Cross tube ☒</td> <td>Water Jet ☐</td> <td>Engineering ☐</td> </tr> <tr> <td>Machining ☐</td> <td>Small Fab ☐</td> <td>Prod. Eng. Coord. ☐</td> <td>Quality ☐</td> </tr> <tr> <td>Thermoforming ☐</td> <td>Finishing ☐</td> <td>Rec/Store/Packaging ☐</td> <td>Other ☐</td> </tr> <tr> <td>Large Fab ☐</td> <td>Composite ☐</td> <td>Supplier ☐</td> <td></td> </tr> </table>				Skid-tube ☐	Cross tube ☒	Water Jet ☐	Engineering ☐	Machining ☐	Small Fab ☐	Prod. Eng. Coord. ☐	Quality ☐	Thermoforming ☐	Finishing ☐	Rec/Store/Packaging ☐	Other ☐	Large Fab ☐	Composite ☐	Supplier ☐																																																			
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Date: <u>15.09.09</u>		Step #: <u>130</u>		QTY Effective: <u>①</u>		MRB (QSI042) Approval <u>DAS</u> <u>12</u> <u>9-89</u> <u>15/9/3</u>																																																																	
Description Work Order Deviation				Disposition																																																																			
Wall thickness measurement is out of tolerance.				Acceptable. Min wall is within 0.020 of dwg nominal.																																																																			
				Completed By <u>DAS</u> <u>47</u> <u>15.9.9</u> <u>9-89</u> Lead hand / Supervisor Approval Verification <u>DAS</u> <u>47</u> <u>15.9.9</u> <u>9-89</u> <u>9-89</u>																																																																			
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Work Order ID 135169***135169***

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July 31, 2015 3:27:23 PM

Item ID: D350-748-243TRN

Accept

N900040100Setup Start ***NS1***

Revision ID:

Stop ***NS2***

Item Name: Crosstube Installation, High Aft

Start Date: 7/31/2015 Start Qty: 1.00

1

Cust Item ID:

Required Date: 8/14/2015 Req'd Qty: 1.00

1

Customer:

Reference:

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____

Run Start ***NR1***

QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Stop ***NR2***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
150		0.00							
150	Large Fab								
Crosstubes	Memo	0.02							
Crosstubes	1-Grind machining marks								
190		0.00							
190	Packaging								
Packaging	Memo	0.00							
Packaging	Identify and stock in kanban rack Location: <u>LG 003</u>								
200		0.00							
200	QC21- Final Inspection - Work Order Release								
QC	Memo	0.02							
Quality Control									

MLJ SEP 21 2015

DQA: _____ Date: _____



WORK ORDER NON-CONFORMANCE / UPDATE

QA Closed: _____ Date: _____

Work Order update only ☐

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Root Cause		FAULT CATEGORY																							
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Material ☐	Use for Testing ☐	Cuffs ☐	Contamination ☐	Out of Sequence ☐	Part Moved ☐																				
Internal Transport ☐	Poor Information ☐	Crushing ☐	Countersink ☐	Off-set ☐	Drawing ☐																				
Tribal Knowledge ☐	Rushing ☐	Heat Treat ☐	Cut Too Short ☐	Mislabeled ☐	Finish ☐																				
LOA ☐	Product Improvement ☐	Wave/Twist in Tube ☐	Instructions Incomplete/Unclear ☐	Fit/Function ☐	Misread ☐																				
Substation ☐	Process Improvement ☐	Marks/Chatter ☐	Drill Holes ☐	Misaligned/off center ☐	Turning Sequence ☐																				
Past Expiry Date ☐	Manufacturing Process ☐	OTHER :																							
Misidentified ☐	Past Due ☐																								

Picklist Print

July 31, 2015 3:27:29 PM

Page 1

Work Order ID: 135169

135169

Parent Item: D350-748-243TRN

D350-748-243TRN

Parent Item Name: Crosstube Installation, High Aft

Start Date: 7/31/2015

Required Date: 8/14/2015

Start Qty: 1.00

Required Qty: 1.00

Comments: IPP Rev: PRELIM New Issue LL 12.05.08

Component Item ID/ Item Name	Replacement Item ID	Mfg/ Purch	Bin Item	Primary Location	Last Location	Route Seq ID	Unit of Measure	Qty on Hand	Qty per Kit	Total Qty	Qty Issued	Date Issued	Status
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D6021-125		Manufactured	No				Each	103.0000		1			
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D6021-125

Crosstube Material - 17-4Ph SS

Location	Loc Qty	Loc Code
HALL	71	
127271	35	
127272	16	
85076	20	
LG	32	
127272	32	

_____ 1 mm L 15/08/13

Item	Qty -243	Part Number	Description
1	X	D350-748-243	CROSSTUBE ASSEMBLY (AS 350/355 HI AFT)
2	1	D6021-125	CROSSTUBE
3	2	D3502-1	SUPPORT
4	2	D5123-7	CLAMP CUSHION
5	1	AETC-1032	INSERT
6	2	MS21920-20 OR MS21920-21/-22	CLAMP (PER DART SPEC. M-MS21920-20/-21/-22)
7	1	NAS1149C0363R	WASHER (OR AN960C10)
8	1	NAS1635-3-8	SCREW (OR MS51958-63)
9	A/R	PROSEAL 890 B-2	SEALANT, AMS-S-8802 CLASS B-2

GENERAL NOTES:

- 1) MATERIAL: MANUFACTURED FROM D6021-125
FINISHED LENGTH AFTER TURNING = 124.70±0.06 (AFTER BENDING/TRIMMING = 122.70 REF)
- 2) FINISH: PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
PAINT OUTSIDE PER DART QSI 005 4.2
- 3) TOLERANCE: PER DART QSI 018 UNLESS OTHERWISE NOTED.
WALL THICKNESS ECCENTRICITY PER DART QSI 038 7.2
MIN. ALLOWABLE WALL IS -0.020 FROM NOMINAL
- 4) UNITS: INCHES UNLESS OTHERWISE NOTED.
- 5) BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
- 6) IDENTIFICATION: DART PART NUMBER "D350-748-243" AND BATCH NUMBER ON INSIDE OF CUFF
PER DART QSI 044 6.4 (VIBRATING STYLUS)
- 7) WEIGHT: 29.85 lbs
- 8) PART IS SYMMETRIC ABOUT CENTERLINE, EXCEPT FOR Ø0.290 HOLE.
- 9) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE. WHEN DRILLING HOLES EXTREME CARE MUST BE TAKEN AND CAREFUL DEBURRING PERFORMED TO ENSURE A CLEAN HOLE WITH NO CRACKING/CHIPPING/GROOVES.

TURNING

- 10) BLEND OUT ALL EDGES FROM MACHINING LONGITUDINALLY, TRANSITION SHOULD BE SMOOTH. NOTE: ALL HOLES ARE DRILLED AFTER BENDING.

BENDING

- 11) BEND PROGRESSIVELY WITH A MINIMUM OF 7 PASSES PER SIDE. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D. ON TOP HALF OF BEND, AND 8% ON BOTTOM HALF OF BEND.
- 12) MAX AMPLITUDE OF RIPPING ALONG BENT PORTION OF THE TUBE IS 0.030 (ZN A1-3)
- 13) MAX TWIST: WITH XTUBE LAYED FLAT ON SURFACE, THE DIFFERENCE BETWEEN CUFF HEIGHTS FROM THE SURFACE MAY BE NO LARGER THAN 0.38 (ZN C1-3).

ASSEMBLY

- 14) TO INSTALL D3502-1 SUPPORT: ABRABE MATING SURFACE OF SUPPORT AND CROSSTUBE WITH 180-GRIT SANDPAPER AND REMOVE RESIDUE WITH MEK (OR EQUIVALENT). APPLY A 0.02" TO 0.05" THICK LAYER OF PROSEAL 890 CLASS B-2 (OR AMS-S-8802 CLASS B-2) SEALANT TO MATING SURFACE OF SUPPORT.
- 15) TORQUE CLAMPS 80 TO 80 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING. PRIOR TO PACKAGING, RE-CHECK TORQUE ON CLAMPS AFTER PROSEAL 890 SEALANT HAS CURED FOR 72 HOURS.

20150807

SH 135169

RELEASED

UNDER REVIEW

15/14/13
LRF 15-541

2015 MAR 18

15-541

A	NEW ISSUE	OP	15.01.21
REV.	DESCRIPTION	BY	DATE
DESIGN	AP		
DRAWN	AP		
CHECKED	AP		
MFG. APPR.			
APPROVED			
DE APPR.			
DATE	15.01.21		

DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA	
DRAWING NO. D350-748-243	REV. A
TITLE CROSSTUBE (AS 350/355 HI AFT)	SHEET 1 OF 4
SCALE NTS	

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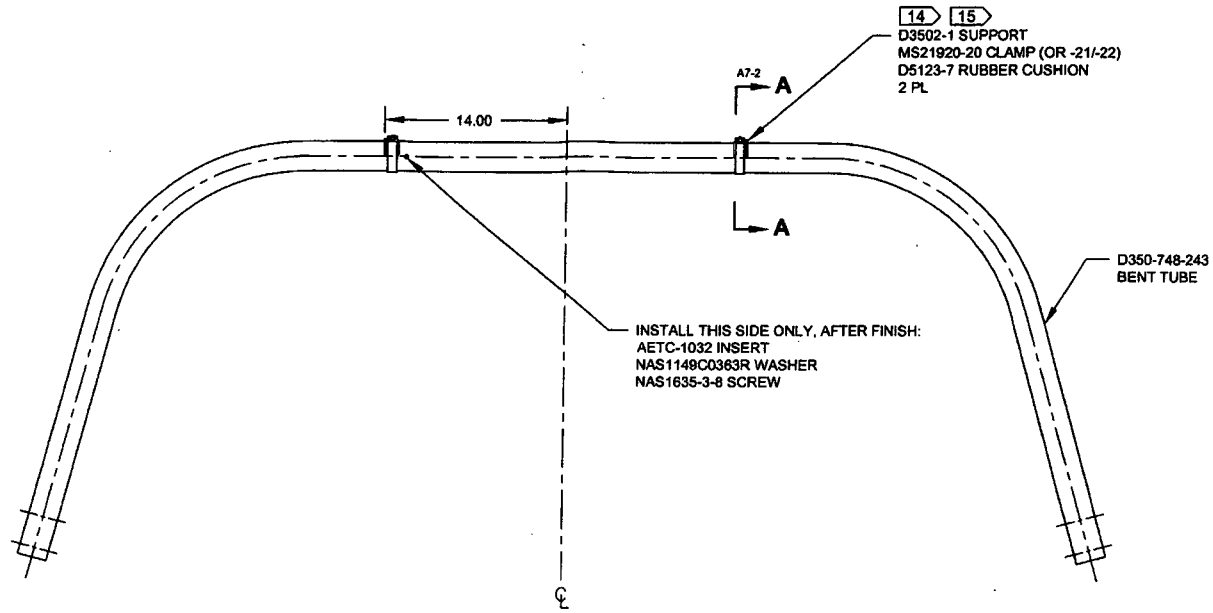
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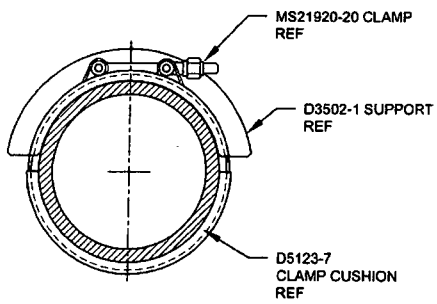
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**D350-748-243
ASSEMBLY DETAIL**



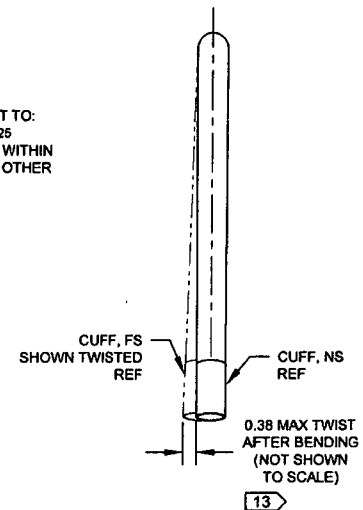
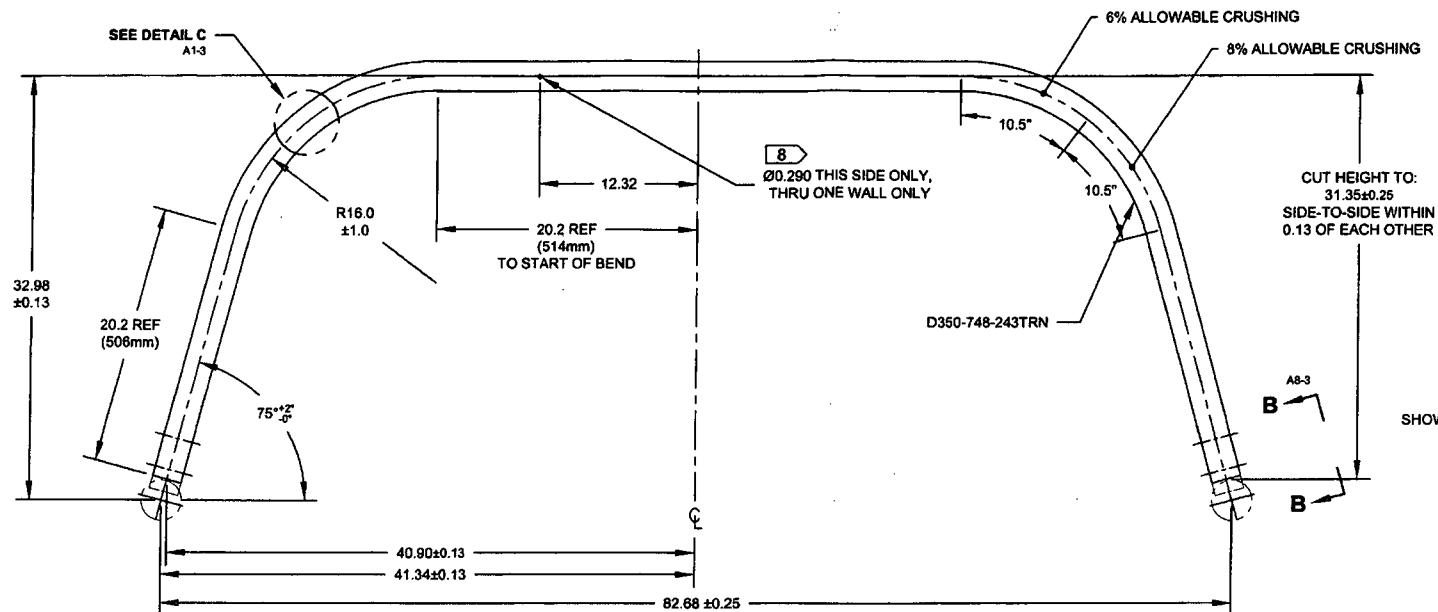
SECTION A-A D4-2
SCALE 6X

UNDER REVIEW
15/1/21

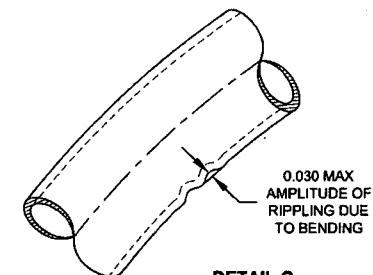
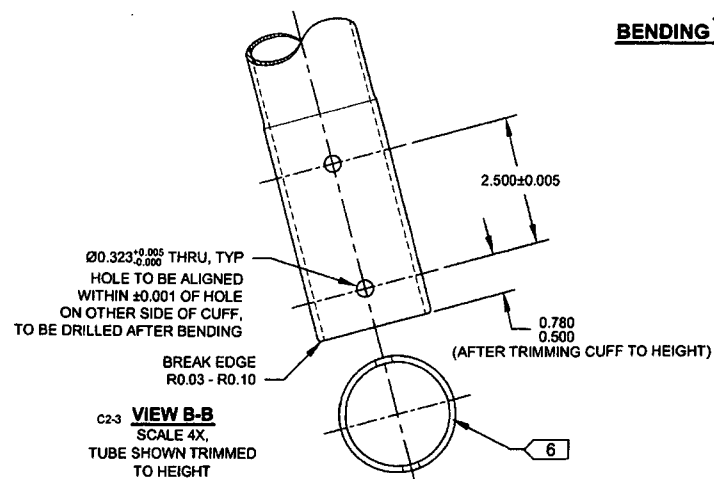
RELEASED
2015 MAR 18

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DRAWN	AP		
CHECKED	A.P.	DRAWING NO.	REV. A
MFG. APPR.	[Signature]	D350-748-243	SHEET 2 OF 4
APPROVED	[Signature]	TITLE	SCALE
DE APPR.	[Signature]	CROSSTUBE (AS 350/355 HI AFT)	NTS
DATE	15.01.21	COPYRIGHT © 2015 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.	

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D350-748-243
BENDING AND DRILLING DETAIL 11



DETAIL C D7-3
SCALE 4X
RIPPLING EXAGGERATED

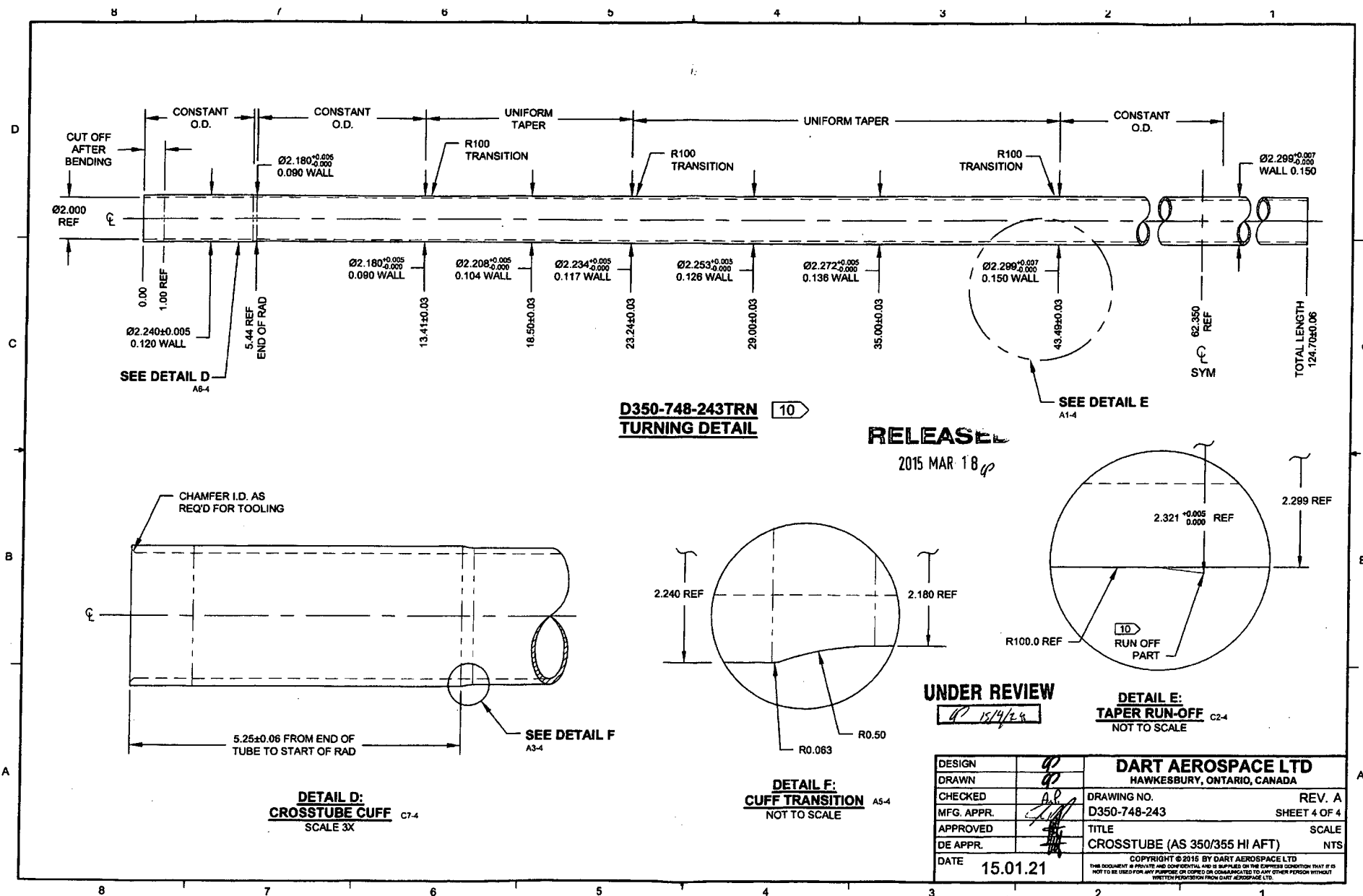
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2015 MAR 18

UNDER REVIEW

15/14/20

DESIGN	9	DART AEROSPACE LTD	
DRAWN	9	HAWKESBURY, ONTARIO, CANADA	
CHECKED	A.P.	DRAWING NO.	REV. A
MFG APPR.	15/14/20	D350-748-243	SHEET 3 OF 4
APPROVED	15/14/20	TITLE	SCALE
DE APPR.	15/14/20	CROSSTUBE (AS 350/355 HI AFT)	NTS
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DART AEROSPACE LTD		Work Order:	135169
Description: Crosstube Assembly (AS350/355 High Aft)		Part Number:	D350-748-241
Inspection Dwg: D350-748-241 Rev: A <i>mail</i>		Page 1 of 2	

283
mm

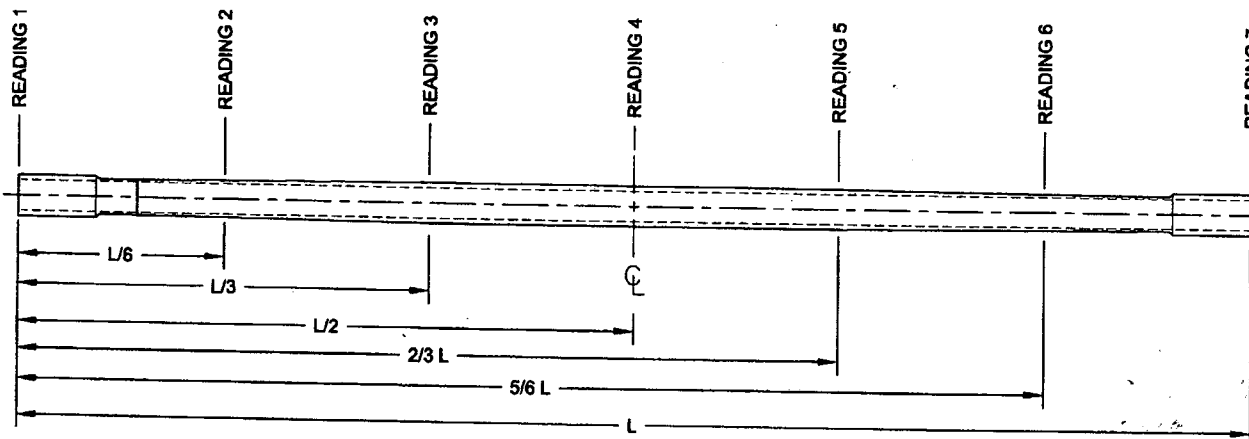
FIRST ARTICLE INSPECTION CHECKLIST

Inspection Sheet	Drawing Dimension	Tolerance	Actual Dimension	Accept	Reject	Method of Inspection	Comments
SIDE A	2.240	+0.005/-0.000	2.245	✓		vern	CNC-08
	2.180	+0.005/-0.000	2.185	✓			
	2.180	+0.005/-0.000	2.184	✓			
	2.208	+0.005/-0.000	2.212	✓			
	2.234	+0.005/-0.000	2.236	✓			
	2.253	+0.005/-0.000	2.255	✓			
	2.272	+0.005/-0.000	2.277	✓			
	2.299	+0.005/-0.000	2.301	✓			
	0.063	+/-0.010	.063	✓		vern	CNC-08
	5.25	+/-0.060	5.26	✓		P1	
	R0.063	+/-0.010	.063	✓		R6	
	R0.50	+/-0.030	.500	✓		"	
SIDE B	2.240	+0.005/-0.000	2.243	✓		vern	CNC-08
	2.180	+0.005/-0.000	2.183	✓			
	2.180	+0.005/-0.000	2.182	✓			
	2.208	+0.005/-0.000	2.210	✓			
	2.234	+0.005/-0.000	2.231	✓			
	2.253	+0.005/-0.000	2.253	✓			
	2.272	+0.005/-0.000	2.277	✓			
	2.299	+0.005/-0.000	2.303	✓			
	0.063	+/-0.010	.063	✓		vern	CNC-08
	5.25	+/-0.060	5.26	✓		"	
	R0.063	+/-0.010	.063	✓		R6	
	R0.50	+/-0.030	.500	✓		"	
	124.70	+/-0.060	124.700	✓		tape	LG-11

DART AEROSPACE LTD		Work Order:	135169
Description: Crosstube Assembly (AS350/355 High Aft)		Part Number:	D350-748-241
Inspection Dwg: D350-748-241 Rev: <i>H A mmL</i>		Page 2 of 2	

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mmL

WALL THICKNESS MEASUREMENT



Location	WALL THICKNESS MEASUREMENT (IN)				Deviation Δw (max-min)	TOLERANCE
	w1	w2	w3	w4		
READING 1 L= 0"	.129	.128	.128	.136	.002	0.030"
READING 2 L= 21	.125	.122	.113	.114	.012	
READING 3 L= 42	.171	.148	.140	.157	.031	
READING 4 L= 62	.158	.157	.156	.159	.003	
READING 5 L= 83	.165	.161	.156	.147	.018	
READING 6 L= 104	.125	.144	.114	.091	.053	
READING 7 L= 124	.127	.136	.136	.121	.015	

Dwg

0.147 0.057

0.111 0.020

Calibration Result

DAS

Actual Block Thickness: 100.500

47

Sitescan 250 Measured Thickness: 100.500

Measured by:	<i>mmL</i>
Date:	15/08/19

Audited by:	9-89
Date:	15-08-24

Preliminary Approval:	
Date:	

Rev	Date	Change	Revised by	Approved
B	12.02.02	Dwg Rev updated (P/O D350-748-201)	KJ	
C	12.06.04	Wall thickness form added	KJ	
D	13.02.27	Dimension 5.25 was 4.26	KJ	
E	14.04.25	122.70 dimension revised to 124.70	KJ	
F	15.04.14	Dwg Rev updated	KJ	